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ABSTRACT

Stability of child and mother characteristics and the predictability of children's cognitive competence and affective characteristics were investigated as part of a longitudinal study. At 2 years of age, 46 sets of male twins and their parents were observed in the home and were rated for attachment, independence, compliance and conscience on the basis of interviews with the mother. At approximately 9 years of age 35 of the twin pairs were followed up both at home and at school. Mothers were interviewed on their perceptions of their children and their child-rearing practices and the children were administered Raven's Coloured Progressive Matrices, the Crichton Vocabulary Scale and the Peabody Individual Achievement Tests. Measures such as dominance, cooperation, and conflict were derived from videotaped structured family interaction tasks. The stability of the characteristics of mothers and their sons was assessed by correlating the ratings made at 2 years of age with the ratings of the corresponding traits at age 9. A more limited follow-up of singleton children and their mothers was also conducted. When twin and singleton data were combined, cognitive characteristics were found to be both stable and predictable from toddlerhood, but significant prediction of social characteristics from the child's own traits at 2 years of age was rarer and weaker. Mother's child-rearing practices and attitudes, when the child was 2, were somewhat more predictive of the child's social trait ratings at approximately 9 years of age. (Author/RH)

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CONTINUITIES AND DISCONTINUITIES IN COGNITIVE AND

SOCIAL CHARACTERISTICS FROM AGE 2 TO AGE 9

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That a person's behavior will change according to the situation and the company he finds himself in is commonly accepted. However, it is widely believed that over and above these changes, behavior and the general framework of behavior which we call 'personality', is predictable and relatively stable over time, and particularly stable for the same kind of situation across time. Situational variability, embedded in behavioral stability can be illustrated by the finding that mothers kiss their second-born infants much less frequently than their first-borns, but that the rank-ordering of different mothers for kissing first- and second-borns is extremely similar ($r: .72$ - Jacobs & Moss, 1976). Whether we can typically detect such continuity in personality dispositions in empirical data, even allowing for differential demands of the situation and for transformations over age, has been the subject of renewed heated debate in the last few years. Some of the prominent participants in this debate grace the platform this morning.

Empirical data can never finally resolve the question whether coherence and continuity of personality are facts of nature. But accumulated evidence from several studies could clarify a confused situation by introducing more refined distinctions and weigh the scales more on one side or the other. In this hope I will present to you data from a 10-year research project, investigating parent-child interactions and the socialization process in twin and singleton families. At age 2, 46 sets of male twins and their parents were observed in the home and rated for certain characteristics on the basis of interviews with mother. (Lytton, 1980). Recently, when the boys were 8 - 10 years old, 35 of the original twin pairs were followed up

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both at home and at school. Four pairs refused to participate or participated only in a limited way. The others were out of reach or could not be traced.

The questions that this paper addresses are: 1) How stable are child and mother characteristics over this 7-year span? 2) How predictable are the child's cognitive competence and affective characteristics from the sets of child characteristics and mother characteristics measured at age 2, as well as from mother's education and birth factors?

Methods at age 9.

The mother was interviewed on her perceptions of the children and her child-rearing practices. The interviewer then rated the children on the same social characteristics on which they had been rated at age 2: attachment, independence, compliance and conscience, with each trait being anchored to responses to a number of specific questions, and the definitions of each trait being spelled out. However, at age 9 these traits were redefined from age 2, in accordance with age expectations, and the interview questions were modified accordingly. For example, while proximity and affection-seeking entered into the rating for 'Intensity of Attachment', a guide for the mid-point on this scale was, among other things, hugging and kissing 3-5 times a day. This mid-point for 'Intensity of Attachment' was considered optimal, indicative of secure attachment. Mothers were rated in a similar way on variables such as consistency, warmth, etc., that had been rated 7 years earlier, again with the definitions of scale points being modified to accord with age expectations. Parallel father and teacher measures were obtained, but will not be reported here, except for the rating of speech maturity, which was assigned by the child's teacher alone. Mothers also completed the Rutter questionnaire (Rutter, Tizard and Whitmore, 1970), assessing the children's adjustment/maladjustment.

The children were given individual intelligence tests at school: Raven's Coloured Progressive Matrices as a nonverbal test, and its companion, the Crichton Vocabulary Scale as a verbal test. The Peabody Individual Achievement Tests were also administered.

As a pale substitute for the observation of unstructured interaction in the home, which we undertook at age 2, we arranged structured family interaction tasks - a competitive game, a construction task and a discussion - which were videotaped and from which we derived measures, such as dominance, cooperation, conflict, for each family member. These measures plus the ratings, were incorporated in factor analyses of child and mother characteristics. Inter-rater reliabilities were obtained for all these measures and were found to be satisfactory (median: .88).

Stability of traits.

The stability of the traits was assessed by correlating the 2-year ratings with the ratings of the corresponding traits at age 9. The raters were, of course, different for the two ages. The correlation between the two vocabulary tests, age 2 and age 9, was .78 ($p < .0001$). Note that in IQ measures differential age norms are allowed for by means of a precise, quantitative norming process, whereas for ratings allowances are made on a subjective basis. The two speech maturity ratings had a lower, but significant correlation of .38 ($p < .01$, one-tailed). Vocabulary and speech were the two cognitive variables available for both ages. None of the child social characteristics - attachment, independence, compliance, conscience - had a significant stability coefficient. For mother's child-rearing practices, however, we obtained two stability coefficients significant at the .05 level, namely consistency of enforcement of rules and use of praise, and others approached significance. Others have also found children's behavior to be more variable over time than adults' (cf. Clarke-Stewart, Vanderstoep & Killian, 1979).

Twenty-six of the singletons of the earlier sample were also followed up, in a more limited way, a year or two earlier and we have teacher ratings and ratings based on interviews with mothers available. We can combine the results of the twin and the singleton follow-up, to see whether the combined p values provide stronger findings than each investigation taken separately. In fact, this aggregation of samples does not strengthen or extend the stability findings, the only change being that,

mother's use of physical punishment is now significantly stable, but the use of praise loses its earlier significance.

Prediction of cognitive and social characteristics.

Since Total IQ (the average of the verbal and nonverbal scales) and the total of the achievement test scores were highly intercorrelated and were both expressed as percentiles, we added the two scores together to form the composite variable 'Cognitive Competence'. This was the criterion to be predicted from four waves of child variables, with each wave entered as a separate step in a multiple regression analysis: (This analysis was done for twins only.)

- 1) mother's education - this explains 19% of the variance;
- 2) birth information - explaining 7% of the variance;
- 3) the child's characteristics at age 2 - vocabulary IQ explains 27% additional variance, the social characteristics explain 9% - they were entered together at one step; the variables up to here - through age 2 - together explain 62.5% of the 9-year criterion. Lastly, the factor scores derived from ratings of social characteristics at age 9 explain 13% of the variance. The most important factors here are child's good functioning as perceived by mother and by teacher. Altogether these 14 variables explain an astounding 76% of the variance, with mother's education and vocabulary IQ doing most of the work. The much maligned PPVT IQ at age 2 has a correlation of .71 with Cognitive Competence 7 years later. All this is very satisfactory.

A similar prediction from 4 waves of mother variables also accounted for a respectable 54% of the variance of Cognitive Competence.

In contrast, when we attempted to predict the twins' social characteristics from three waves of child variables through age 2, the final predictions were invariably non-significant. The best predicted variable is compliance (rated from interview with mother), though the final prediction is still nonsignificant. All the predictors together explain 35.5% of the variance, compared with 62.5% up to this stage for Cognitive Competence.

Combining the twins' and singletons' analyses for compliance, each

with a nonsignificant F-value, however, produced a significant F ($p = .024$), the only one to do so among the predictions of child social characteristics from earlier child characteristics. The other two variables that reached significance, when the two analyses were combined, were both cognitive ones: a rating of academic competence and of speech maturity.

However, the social characteristics of conscience and compliance turned out to be somewhat more - and significantly - predictable from mother's 2-year child-rearing attitudes than from the child's own characteristics, with mother's use of praise and approval, and her warmth being particularly strong predictors. Combining the twins' and singletons' analyses, and using mother 2-year variables as the predictors, yielded significant predictions for four child social characteristics (independence, compliance, conscience, maladjustment index), as against only one (compliance), when we predicted from the child's own 2-year characteristics.

Some further failures of prediction: It is sometimes suggested that factors are more predictable than single variables. However, when the criteria were factors, derived from the twins' social characteristics, and the predictors the same child variables as before, no significant prediction could be achieved, either. Nor was factor structure of social characteristics easily replicable over age: prediction from factors of child social characteristics at age 2 to factors at age 9 was almost non-existent, the maximum R^2 being .12. While one 2-year child factor resembled a 9-year child factor in content, the correlation between them was zero, though there was a significant correlation between two superficially dissimilar factors.

The two factors, describing mother's behavior, that were equivalent in content between (child's) ages 2 and 9, however, had a low, but significant correlation. You will remember that mother's characteristics, taken singly, also were more stable than those of the children.

Conclusions

In this investigation cognitive characteristics turned out to be both stable and predictable from toddlerhood; but significant prediction of social characteristics from the child's own 2-year traits was rarer, and when it was achieved, was weaker. It was mother's child-rearing practices and attitudes, when the child was two, that were somewhat more predictive of the child's 9-year social trait ratings. The reason for the higher predictive power of mother's characteristics may well lie in the fact that, being more stable, they will have exerted their influence in a more stable and predictable fashion throughout the years between 2 and 9.

Other longitudinal investigations have similarly found cognitive characteristics to be more stable and predictable than social-emotional measures, e.g. Schaefer & Bayley (1963), Kagan & Moss (1962), Bloom (1964). Anderson (1960) even found that IQ was more important than personality measures in predicting adjustment from age 9 to 18. Vocabulary score seems to be particularly stable among IQ sub-scales (cf. Osborne & Suddick, 1972, for stability from preschool to Grade 5).

What explanations for this difference in predictability between cognitive and social-emotional traits will stand up to scrutiny?

1) We may entertain the hypothesis that measures of cognitive abilities and achievement are more under genetic control than social-emotional traits. Loehlin and Nichols' (1976) evidence does point in this direction. However, our genetic analysis did not demonstrate any significant genetic determination for the variable 'Cognitive Competence', though Nonverbal IQ, one of its components, did have a significant genetic component, and so did speech competence, a related ability. So while the genetic explanation does not hold for our Cognitive Competence variable in this investigation, it may be true for cognitive variables, broadly speaking.

2) It may be thought that cognitive measures tend to have better psychometric properties, e.g. greater reliability. Again, this was not true in the strict sense in this investigation: the test-re-test

reliability figures for the PPVT and the Crichton Vocabulary Scale, and the inter-rater reliability coefficients for personality ratings were fairly comparable - about .85 (PPVT, test-retest, ages 2 - 6; .76; Crichton, age 9: .95; median inter-rater reliability for interview-based ratings and family interaction tasks in our study: .88).

3) However, it seems reasonable to assert that, generally speaking, cognitive tests are more clearly and objectively defined and quantitatively standardized for age than social-emotional measures.

4) We may hypothesize that cognitive characteristics are fairly crystallized by age $2\frac{1}{2}$, when speech has emerged, whereas social characteristics are still in a very fluctuating state and hence more open to influences from changing environmental contexts. However, in the absence of clearly standardized measures of social characteristics of young children this hypothesis is difficult to verify.

5) Lastly, we may glibly speak of "the dynamic equivalence of superficially different behaviors", but we have not yet arrived at any criteria by which we may define equivalent behavior at different ages, criteria that are theoretically defensible or confirmed by a process of construct validation.

Overall, the lack of standardized measures of social traits for young children and the absence of clearly equivalent behaviors for different ages, plus, possibly, lesser genetic influences, seem to me the most arguable reasons for the lower predictability of social, as compared with cognitive traits.

This is not to say, however, that empirical research has never found reasonable stability and predictability for social-emotional variables. Some of the papers in this symposium are evidence to the contrary. There are few studies, comparable to ours, that have followed the social behavior of children from age 2-3 over 5 years or so (Kagan & Moss's analysis of the Fels data lumps together rather broad age periods (e.g. 1 - 3) and interpretation is therefore difficult). Block & Block's (1979) study is an outstanding example of research that has done this and has shown particularly consistency of personality organization within the person.

Schaefer & Bayley (1963) have also shown moderate consistency of attentiveness from 2 to 8. More frequent, however, are the investigations that have shown stability of social-emotional measures from middle childhood on (e.g. Bronson, 1966; Kagan & Moss, 1962; Macfarlane, Allen & Honzik, 1962; Olweus, 1979). There is thus good evidence for continuity in underlying dimensions of personality broadly conceived, and our success in demonstrating it mainly for cognitive aspects of personality simply highlights our inadequacies of conceptualization and instrumentation in the social-emotional area.

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FOUR-WAVE PREDICTION OF COGNITIVE COMPETENCE

FROM CHILD VARIABLES

TWIN PAIR MEANS (N = 34 PAIRS)

PREDICTORS	MULTIPLE R ²	SIMPLE R	% VARIANCE EXPLAINED
1) <u>MOTHER'S EDUCATION</u>	.19**A	.44	<u>19.4</u>
2) <u>BIRTH INFORMATION</u>			
BIRTH WEIGHT	.21*	.20	
TOTAL STRESS INDEX	.26*	-.05	<u>6.7</u>
3) <u>2-YEAR CHARACTERISTICS</u>			
VOCABULARY IQ	.54**A	.71	<u>27.5</u>
COMPLIANCE	.60**A	.39	
INDEPENDENCE	.52**	.08	
SPEECH MATURITY	.63**	.49	
ATTACHMENT	.63**	-.22	<u>8.9</u>
4) <u>9-YEAR SOCIAL CHARACTERISTICS</u>			
FAC 2: GOOD FUNCTIONING - MOTHER'S PERCEPTION	.69**A	.33	
FAC 3: POWER IN FAMILY, INDEPENDENCE	.72**	.12	
FAC 4: OUTGOING PEER RELATIONS VS. TWIN CLOSENESS	.76**	.11	
FAC 1: GOOD FUNCTIONING - TEACHER'S PERCEPTION	.76**	.36	
FAC 5: COMPLIANCE AT SCHOOL WITH NON-COOPERATION AT HOME	.76**	-.08	
FAC 6: ATTACHMENT AND CONSCIENCE IN HOME	.76**	-.10	<u>13.5</u>
ADJUSTED R ²	.58	TOTAL:	76.0

A INCREMENT IN R² SIGNIFICANT ($p < .05$).

FOUR-WAVE PREDICTION OF COGNITIVE COMPETENCE

FROM MOTHER VARIABLES

TWIN PAIR MEANS (N = 34 PAIRS)

PREDICTORS	MULTIPLE R^2	SIMPLE R	% OF VARIANCE EXPLAINED
1) <u>MOTHER'S EDUCATION</u>	.19**A	.44	<u>19.4</u>
2) <u>PREGNANCY INFORMATION</u>			
TOXEMIA	.27**	.31	<u>7.2</u>
3) <u>MOTHER CHARACTERISTICS - CHILD AGED 2</u>			
2FAC3: EXPEDIENCE IN DISCIPLINE	.28*	.17	
2FAC1: POSITIVE AFFECTIVE & COGNITIVE APPROACH VS. PHYSICAL PUNISHMENT	.28*	.09	<u>1.7</u>
4) <u>MOTHER CHARACTERISTICS - CHILD AGED 9</u>			
9FAC5: FOSTERING INDEPENDENCE VS. MATERIAL REWARDS	.38*A	.32	
2FAC2: AUTHORITATIVE STRICTNESS VS. SUPPORT DEPENDENCY (AGE 2)	.38*	.02	
9FAC3: CONSISTENT, STRICT VS. LOVE-ORIENTED DISCIPLINE	.46*	.03	
9FAC4: RESTRICTIVENESS WITH WARMTH	.52*	.38	
9FAC2: POSITIVE AFFECTIVE & COGNITIVE APPROACH VS. PHYSICAL PUNISHMENT	.54*	.21	
9FAC1: EFFECTIVENESS, POWER, WARMTH IN FAMILY INTERACTION	.54*	.13	<u>25.2</u>
ADJUSTED R^2	.34		

TOTAL: 53.5

A INCREMENT IN R^2 SIGNIFICANT ($p < .05$).

THREE-WAY PREDICTION OF COMPLIANCE
FROM CHILD VARIABLES

TWIN PAIR MEANS (N = 35 PAIRS)

<u>PREDICTORS</u>	<u>MULTIPLE R²</u>	<u>SIMPLE R</u>	<u>% OF VARIANCE EXPLAINED</u>
1) <u>MOTHER'S EDUCATION</u>	.04	.21	<u>4.4</u>
2) <u>BIRTH INFORMATION</u>			
BIRTH WEIGHT	.10	-.19	
TOTAL STRESS INDEX	.11	.15	<u>6.5</u>
3) <u>2-YEAR CHARACTERISTICS</u>			
ATTACHMENT RATING	.21	.35	
COMPLIANCE RATING	.30	.13	
INDEPENDENCE RATING	.34*	-.28	
WITH ALL PREDICTORS ENTERED	.36		<u>24.6</u>
ADJUSTED R ²	.16		
TOTAL:			35.5